

What is claimed is:

1. A method of making retroreflective elements comprising:
providing a plurality of core particles;
5 coating the particles with an unsolidified polymeric composition forming coated particles;
combining the coated particles with optical elements in a continuous process such that
optical elements are embedded in the unsolidified polymeric composition; and
solidifying the polymeric composition forming retroreflective elements.
- 10 2. The method of claim 1 wherein the combining of the coated particle and optical
elements comprises mechanically mixing.
3. The method of claim 1 wherein the unsolidified polymeric composition is selected from
a molten thermoplastic resin and a bonded resin core precursor composition
- 15 4. The method of claim 1 wherein an excess of optical elements are provided and the
method further comprises separating the retroreflective elements from the unembedded
optical elements.
- 20 5. The method of claim 1 wherein the core particles ranges in size from about 0.1 mm to
about 3 mm.
6. The method of claim 1 wherein the core particles consist of an inorganic material.
- 25 7. The method of claim 6 wherein the particles consist of a material selected from sand,
roofing granules, and skid particles.
8. The method of claim 1 wherein the mechanical mixing is accomplished by means of at
least one rotating mixing member.
- 30 9. The method of claim 8 wherein the mixing member comprises a rotating disc.

10. The method of claim 8 wherein the mixing member comprises an extruder screw.

11. The method of claim 8 wherein the mixing member comprises a grinding plate.

5 12. The method of claim 8 wherein the mixing member comprises at least two co-rotating or counter-rotating mixing members.

13. The method of claim 1 further comprising combining the unsolidified polymeric composition with at least one light scattering material.

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14. The method of claim 13 wherein the light scattering material is selected from the group comprising diffusely reflecting pigments, specularly reflecting pigment and combinations thereof.

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15. The method of claim 1 wherein the optical elements consist of microcrystalline beads.

16. The method of claim 15 wherein the microcrystalline beads consist of glass-ceramic beads.

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17. The method of claim 15 wherein the microcrystalline beads consist of non-vitreous beads.

18. The method of claim 1 wherein the optical elements are surface treated with at least one adhesion promoting agent.

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19. The method of claim 1 wherein the optical elements are surface treated with at least one floatation agent.

20. The method of claim 19 wherein the floatation agent is a fluorochemical.

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21. The method of claim 1 wherein the optical elements comprise first optical elements having a refractive index ranging from about 1.5 to about 2.0 and second optical elements have a refractive index ranging from about 1.7 to about 2.4.

5 22. A method of making retroreflective elements comprising:
providing a plurality of core particles having surfaces comprising an unsolidified
polymeric composition;
combining the core particles with optical elements by means of a device comprising at
least one rotating mixing member selected from the group consisting of a disc, an extruder
10 screw, co-rotating blades, counter-rotating blades, and grinding plates, such that optical
elements are embedded in the unsolidified polymeric composition; and
solidifying the polymeric composition forming retroreflective elements.

15 23. The method of claim 22 wherein the unsolidified polymeric composition is selected
from a molten thermoplastic resin and a bonded resin core precursor composition

24. The method of claim 22 wherein further comprising coating an inorganic core particle
with the unsolidified polymeric material.

20 25. An apparatus for the continuous manufacture of retroreflective elements comprising:
a means for providing a plurality core particles having surfaces comprising an unsolidified
polymeric composition;
a means for providing optical elements;
a means for embedding the core particle with the optical elements forming retroreflective
25 elements wherein the means comprises at least one rotating mixing member selected from
the group consisting of a disc, an extruder screw, co-rotating blades, counter-rotating
blades and a grinding plate; and
a means for solidifying the polymeric composition forming retroreflective elements.

30 26. A method of coating particles comprising:
providing a plurality of core particles;
coating the particles with an unsolidified polymeric composition forming coated particles;

combining the coated particles with second particles by means of a device comprising at least one rotating mixing member selected from the group consisting of a disc, an extruder a screw, co-rotating blades, counter-rotating blades, and a grinding plate, such that second particles are embedded in the unsolidified polymeric composition; and
5 solidifying the polymeric composition.

27. The method of claim 26 wherein the core particles have a maximum dimension and the second particle have a maximum dimension that is less than half the maximum dimension of the core particles.
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28. The method of claim 26 wherein the unsolidified polymeric composition is a bonded resin core precursor composition

29. The method of claim 26 wherein the core particles comprises an inorganic material.
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30. A method of making retroreflective elements comprising:
providing a plurality of core particles having surfaces comprising an unsolidified polymeric composition;
coating the particles with an unsolidified polymeric composition forming coated particles;
20 combining the coated particles with second particles by means of a device comprising at least one rotating mixing member selected from the group consisting of a disc, a screw, co-rotating blades, counter-rotating blades, and a grinding plate, such that second particles are embedded in the unsolidified polymeric composition; and
solidifying the polymeric composition.
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